

## **APPENDICES**



## Appendix 1

### Distribution Maps of Fish Species

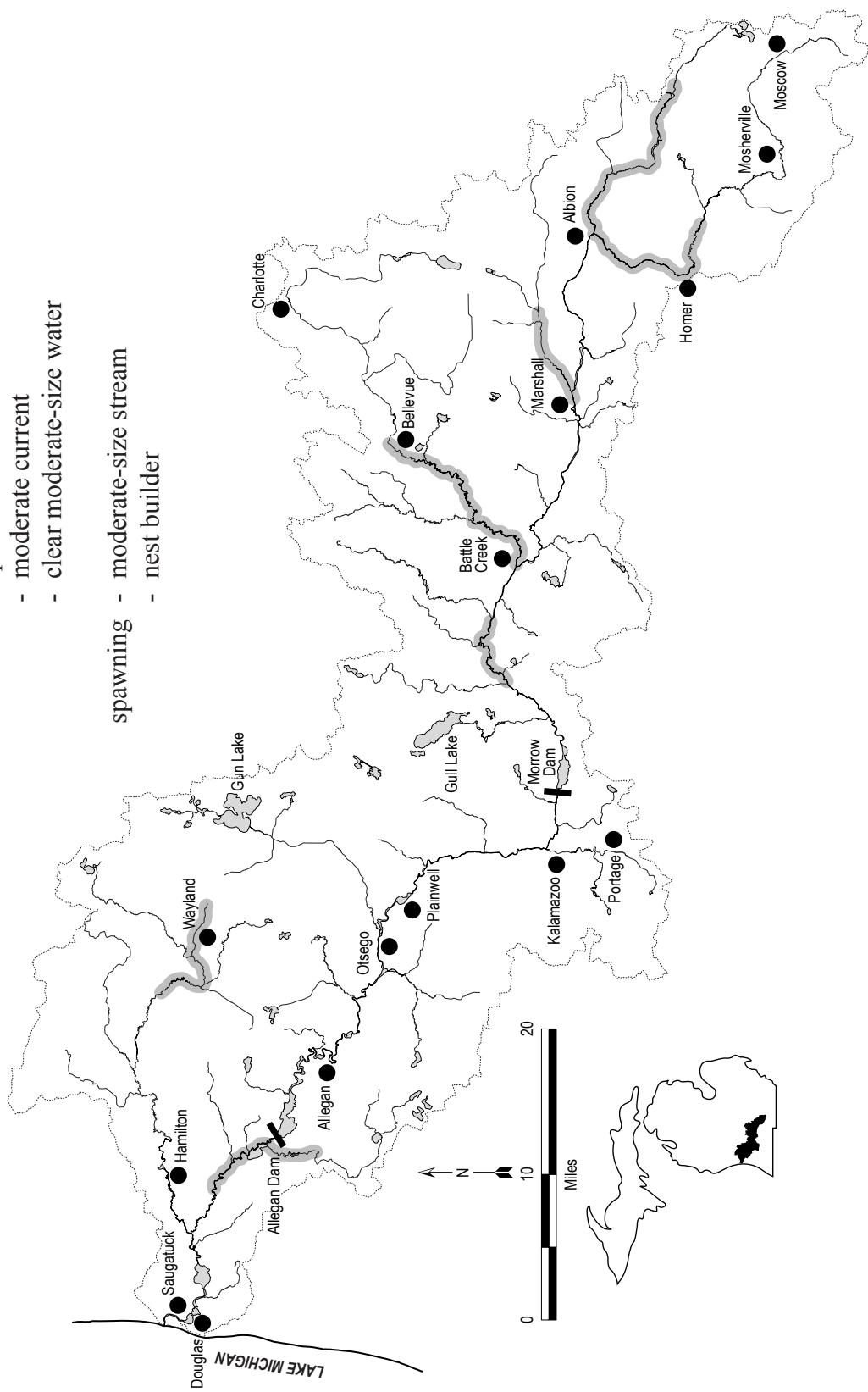
This appendix contains maps of known past and present fish distributions within the Kalamazoo River watershed. The distributions of fish species were compiled from records located at the University of Michigan's Museums Fisheries Library and Michigan Department of Natural Resources' Institute for Fisheries Research and Southern Lake Michigan Management Unit offices. Scientific names and phylogenetic order follow Robins et al. (1991). Species that are listed under Michigan's Endangered Species Act (Part 365, Endangered Species Protection, of the Natural Resource and Environmental Protection Act, Act 451 of the Public Acts of 1994), their status follows their scientific name. Categories are declining, rare, threatened, endangered, extinct, and locally extinct.

Habitat descriptions were compiled from The Fishes of Ohio (Trautman 1982), Freshwater Fishes of Canada (Scott and Crossman 1973), Fishes of Wisconsin (Becker 1983), Fishes of Missouri (Pflieger 1975), and Fishes of the Great Lakes Region (Hubbs and Lagler 1947).



### Chestnut lamprey (*Ichthyomyzon castaneus*)

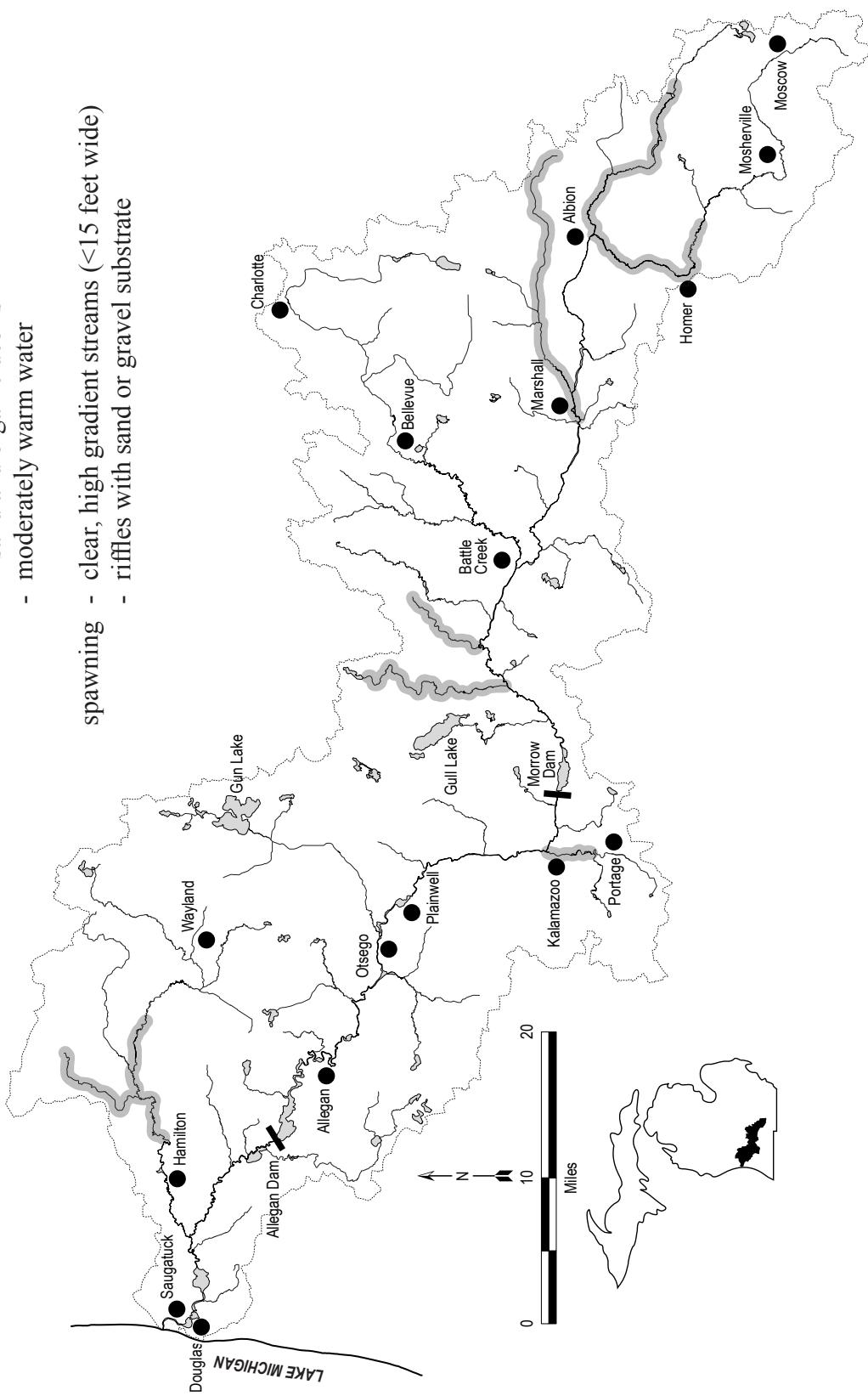
- Habitat:
- feeding
    - stable substrate of sand and silt with light growth of *chara* or quiet backwaters of muck and silt with dense rooted vegetation
    - moderate current
    - clear moderate-size water
  - spawning
    - moderate-size stream
    - nest builder



**Northern brook lamprey (*Ichthyomyzon fossor*)**

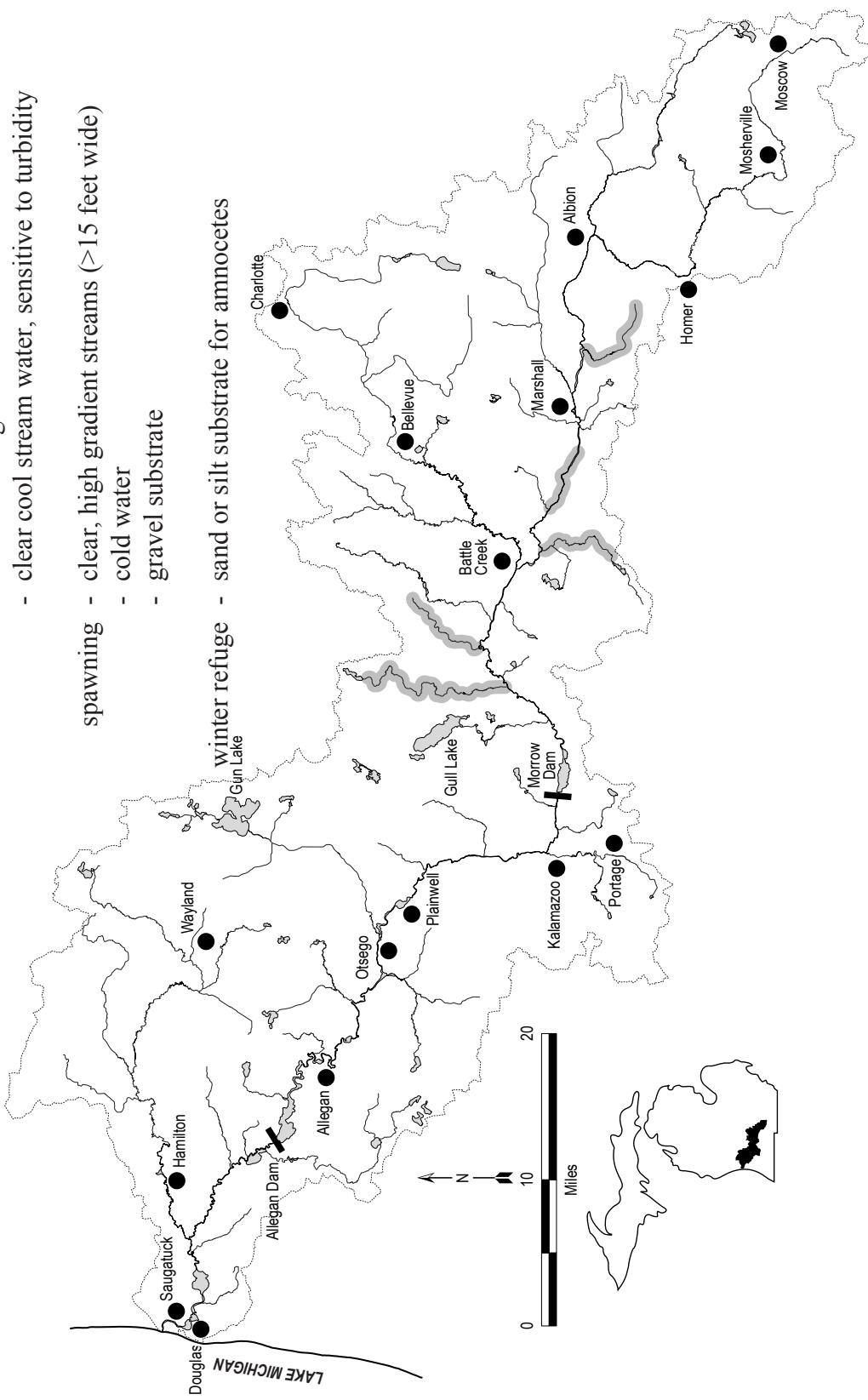
**Habitat:**

- feeding - young: low gradient, substrate with bars and beds of mixed sand and organic debris  
- moderately warm water
- spawning - clear, high gradient streams (<15 feet wide)  
- riffles with sand or gravel substrate



### American brook lamprey (*Lampetra appendix*)

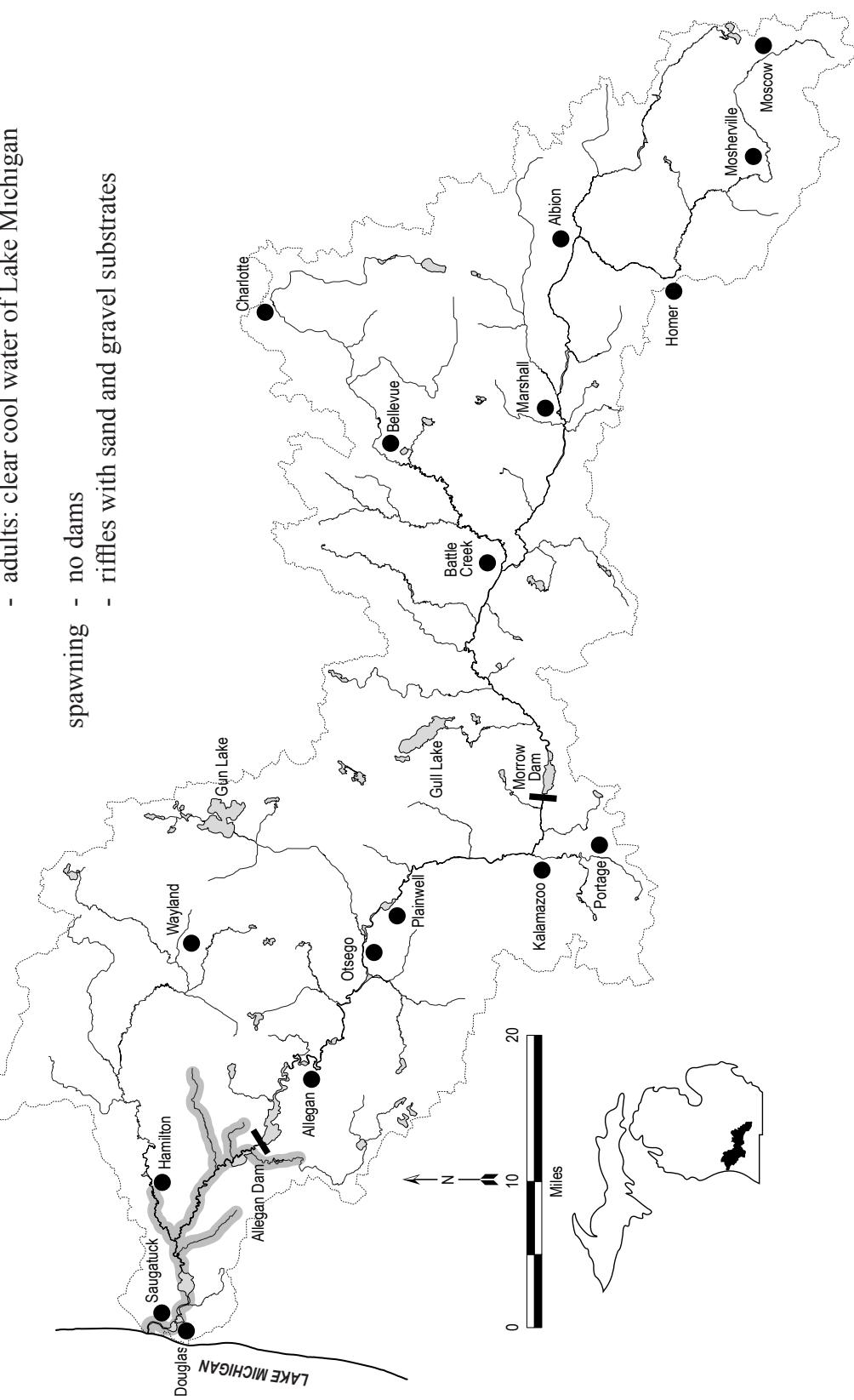
- Habitat:**
- feeding - young: low gradient, substrate with bars and beds of mixed sand and organic debris
    - clear cool stream water, sensitive to turbidity
  - spawning - clear, high gradient streams (>15 feet wide)
    - cold water
    - gravel substrate
  - winter refuge - sand or silt substrate for ammocetes



**Sea lamprey (*Petromyzon marinus*)**

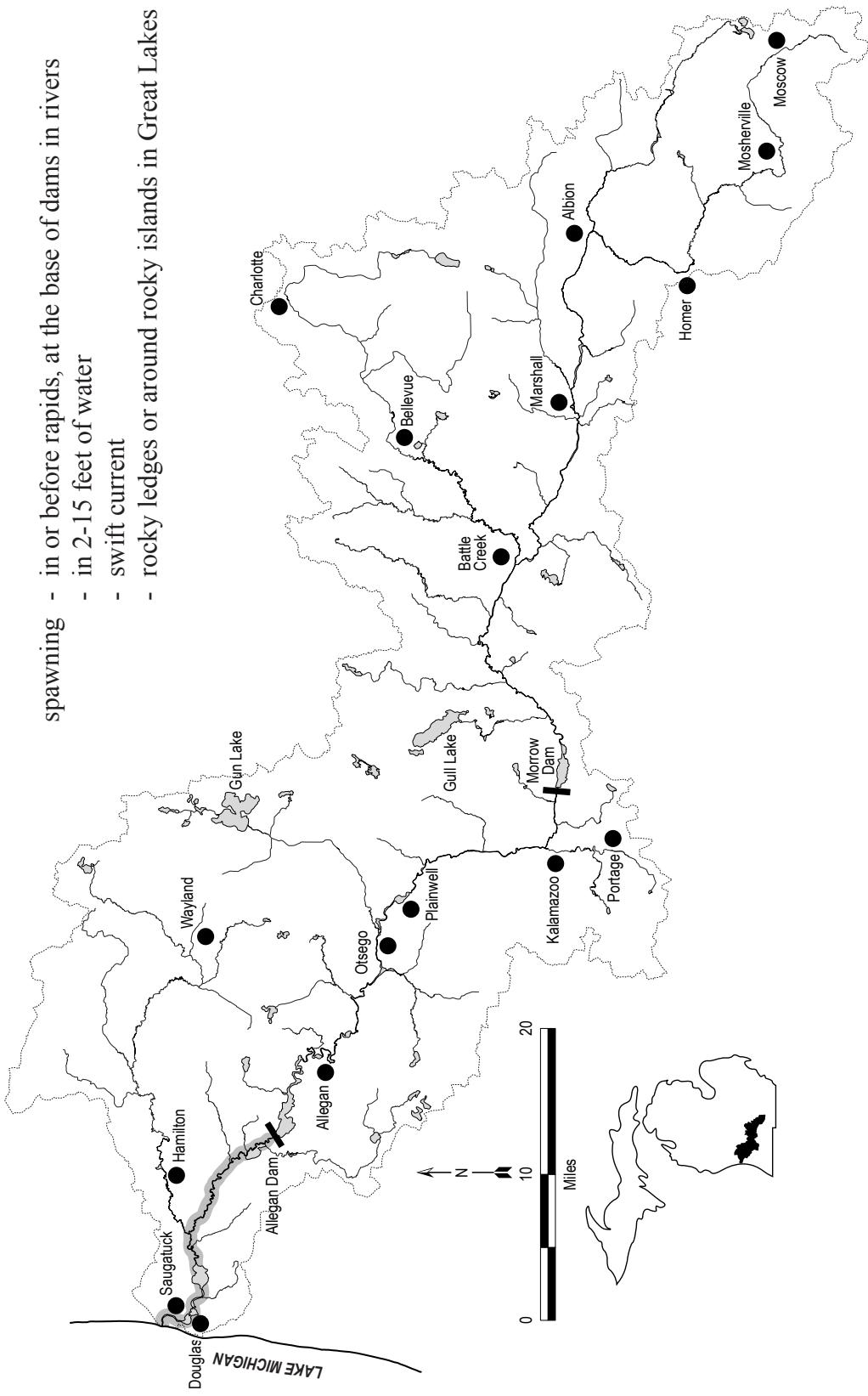
**Habitat:**

- feeding - young: substrate with beds of sand mixed with organic debris
  - cannot tolerate silt
  - adults: clear cool water of Lake Michigan
  
- spawning - no dams
  - riffles with sand and gravel substrates

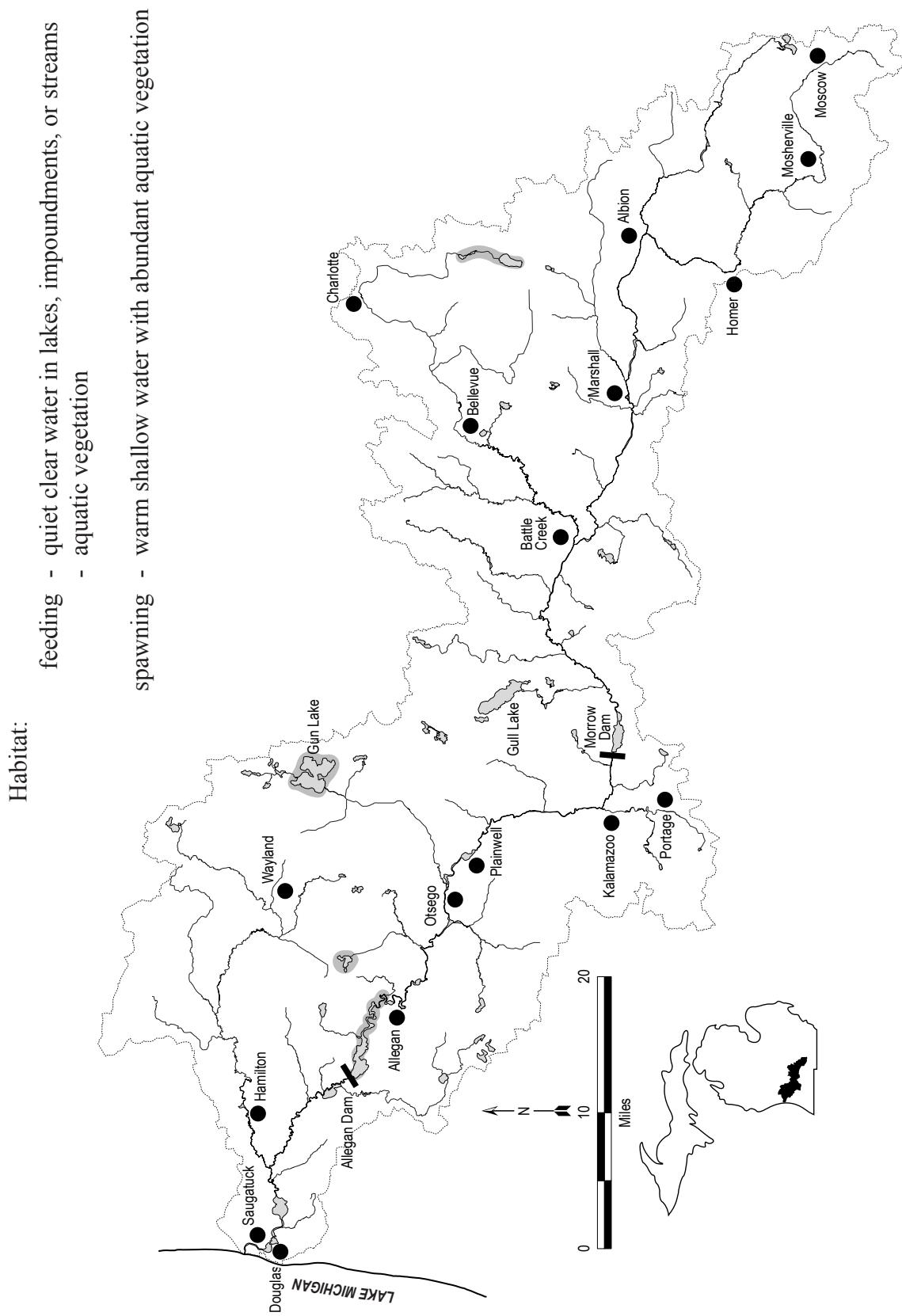


### Lake sturgeon (*Acipenser fulvescens*) - threatened

- Habitat:
- |          |  |
|----------|--|
| feeding  | - shoal areas of large rivers, lakes, and impoundments |
|          | - gravel, sand, rock substrates                        |
| spawning | - in or before rapids, at the base of dams in rivers   |
|          | - in 2-15 feet of water                                |
|          | - swift current  |
|          | - rocky ledges or around rocky islands in Great Lakes  |



**Spotted gar (*Lepisosteus oculatus*)**

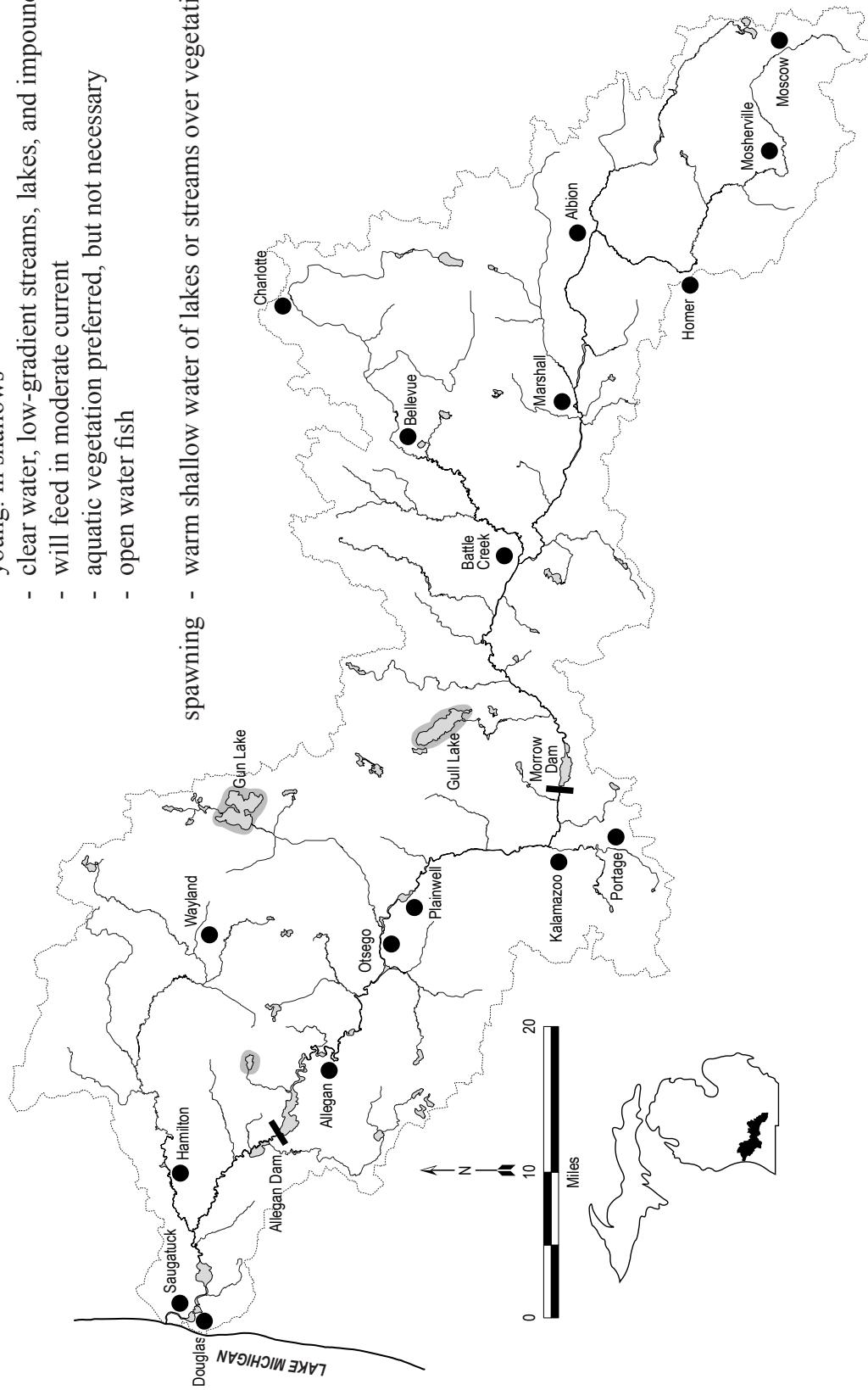


### Longnose gar (*Lepisosteus osseus*)

#### Habitat:

- feeding - adults: in deeper water  
- young: in shallows  
- clear water, low-gradient streams, lakes, and impoundments  
- will feed in moderate current  
- aquatic vegetation preferred, but not necessary  
- open water fish

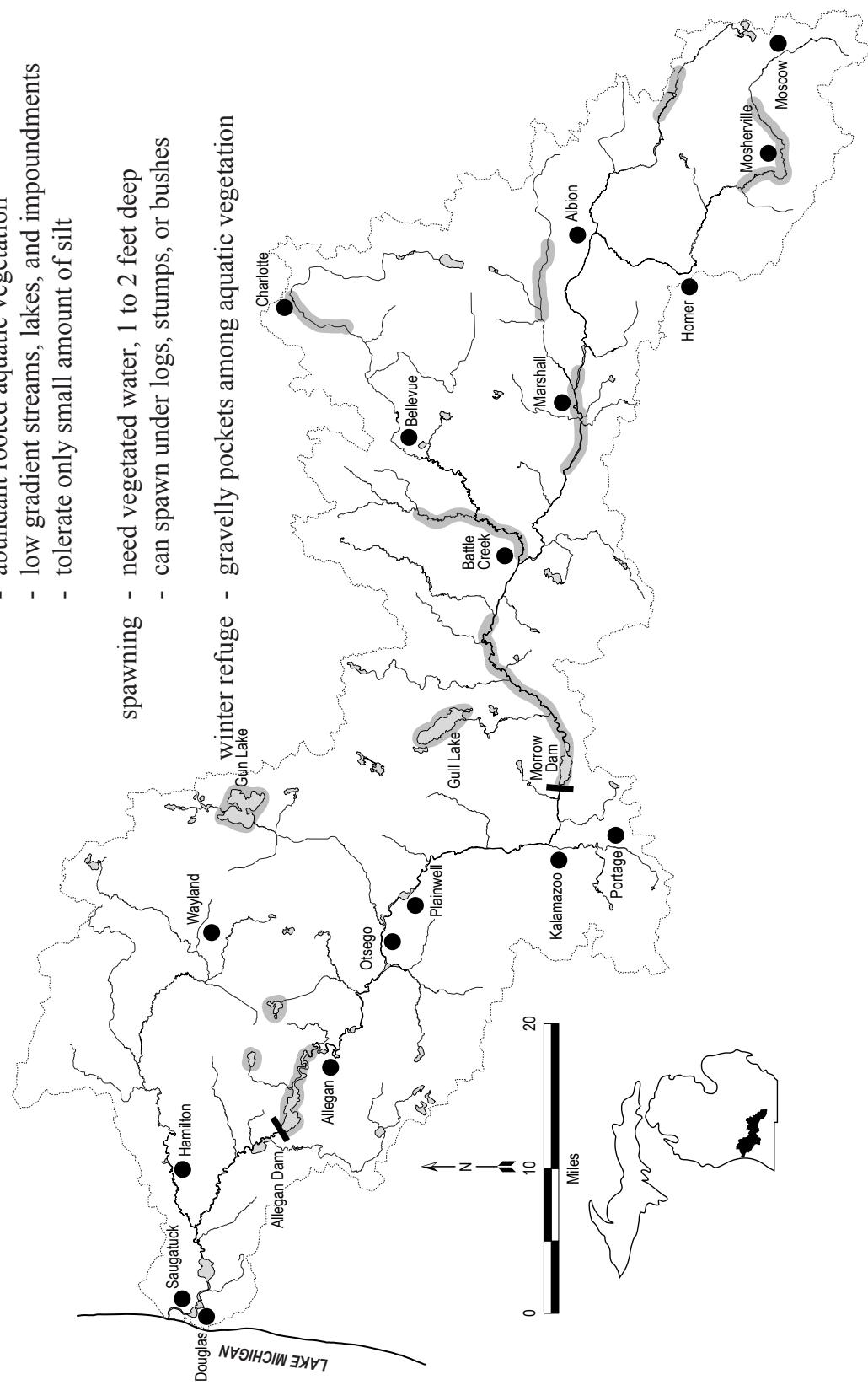
- spawning - warm shallow water of lakes or streams over vegetation



**Bowfin (*Amia calva*)**

**Habitat:**

- feeding - clear water
- abundant rooted aquatic vegetation
  - low gradient streams, lakes, and impoundments
  - tolerate only small amount of silt
- spawning - need vegetated water, 1 to 2 feet deep
- can spawn under logs, stumps, or bushes
- winter refuge - gravelly pockets among aquatic vegetation



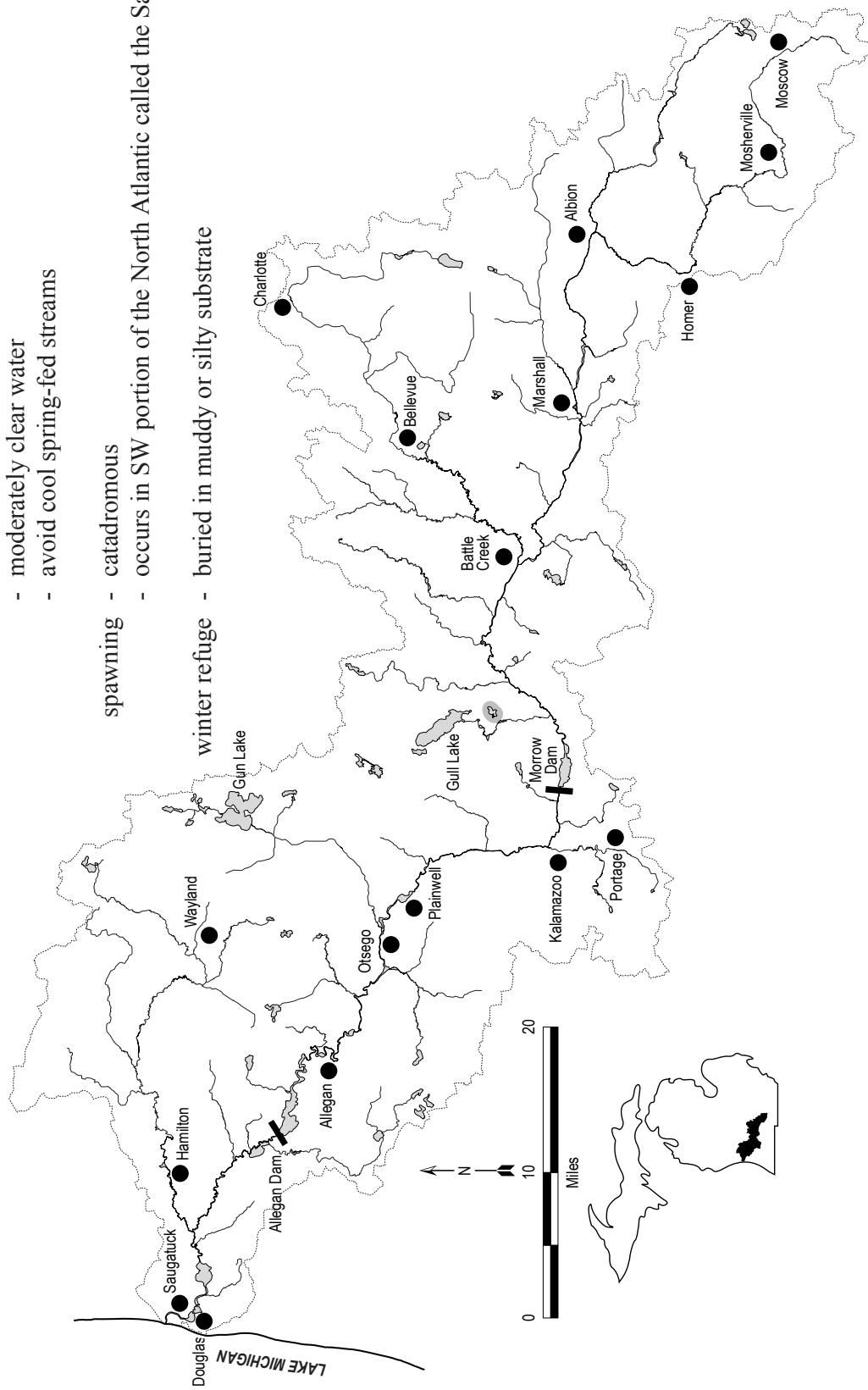
### American eel (*Anguilla rostrata*)

Habitat: feeding - medium to large rivers and Lake Michigan

- must have current
- moderately clear water
- avoid cool spring-fed streams

spawning - catadromous

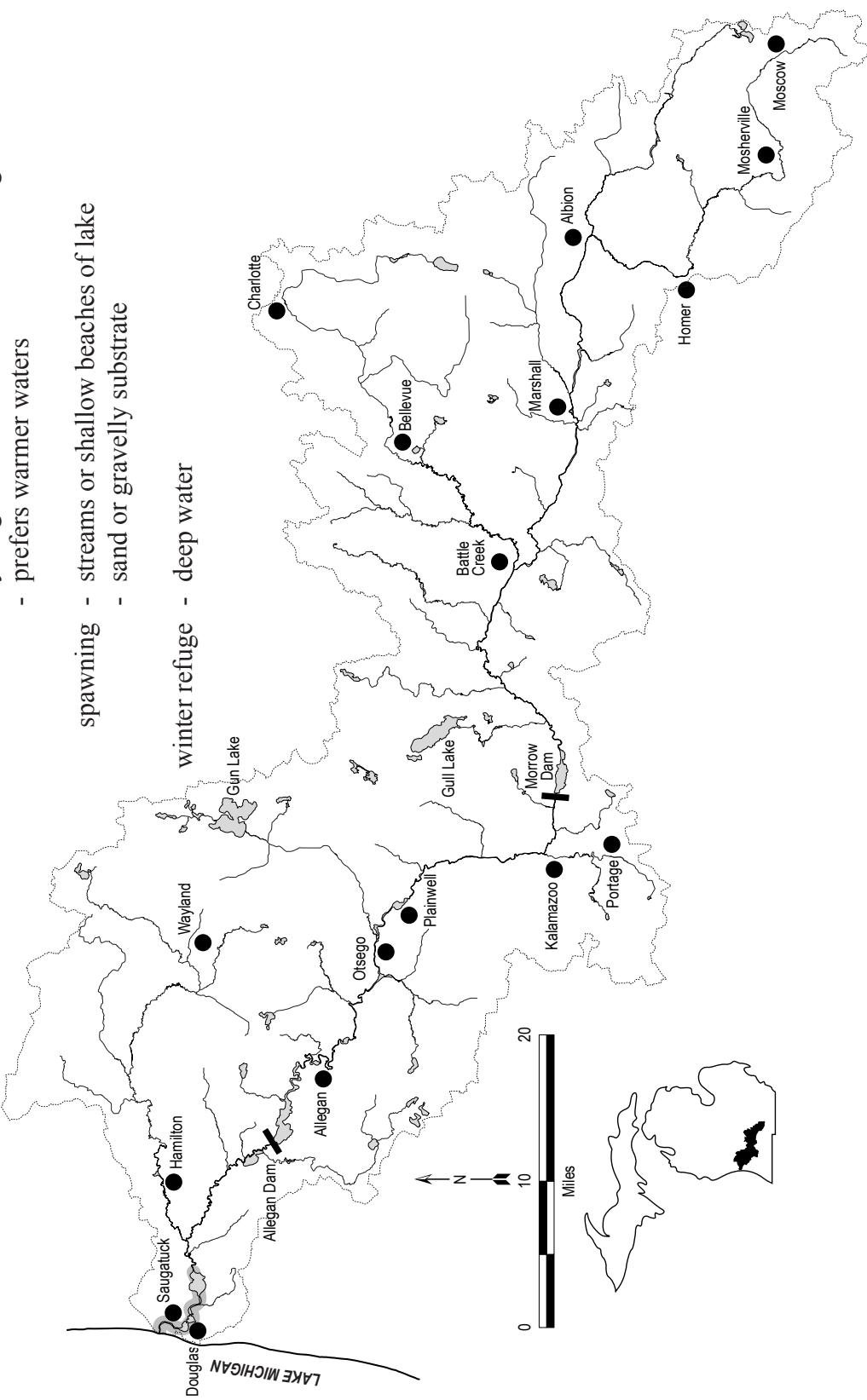
- occurs in SW portion of the North Atlantic called the Sargasso Sea



Alewife (*Alosa pseudoharengus*)

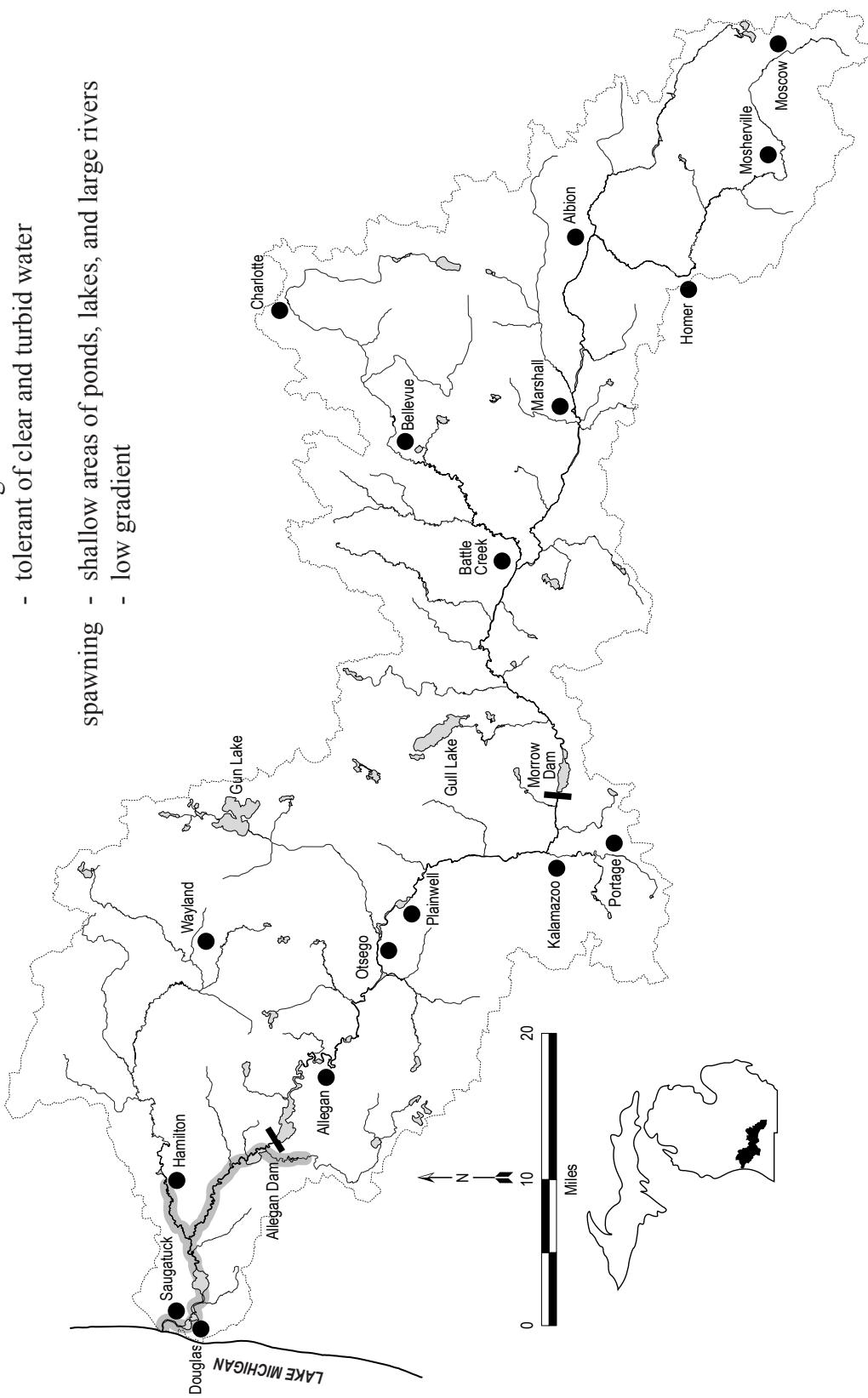
**Habitat:**

- feeding - adults: deep water of Lake Michigan
  - young: shallow water of Lake Michigan
  - prefers warmer waters
  
- spawning - streams or shallow beaches of lake
  - sand or gravelly substrate
  
- winter refuge - deep water

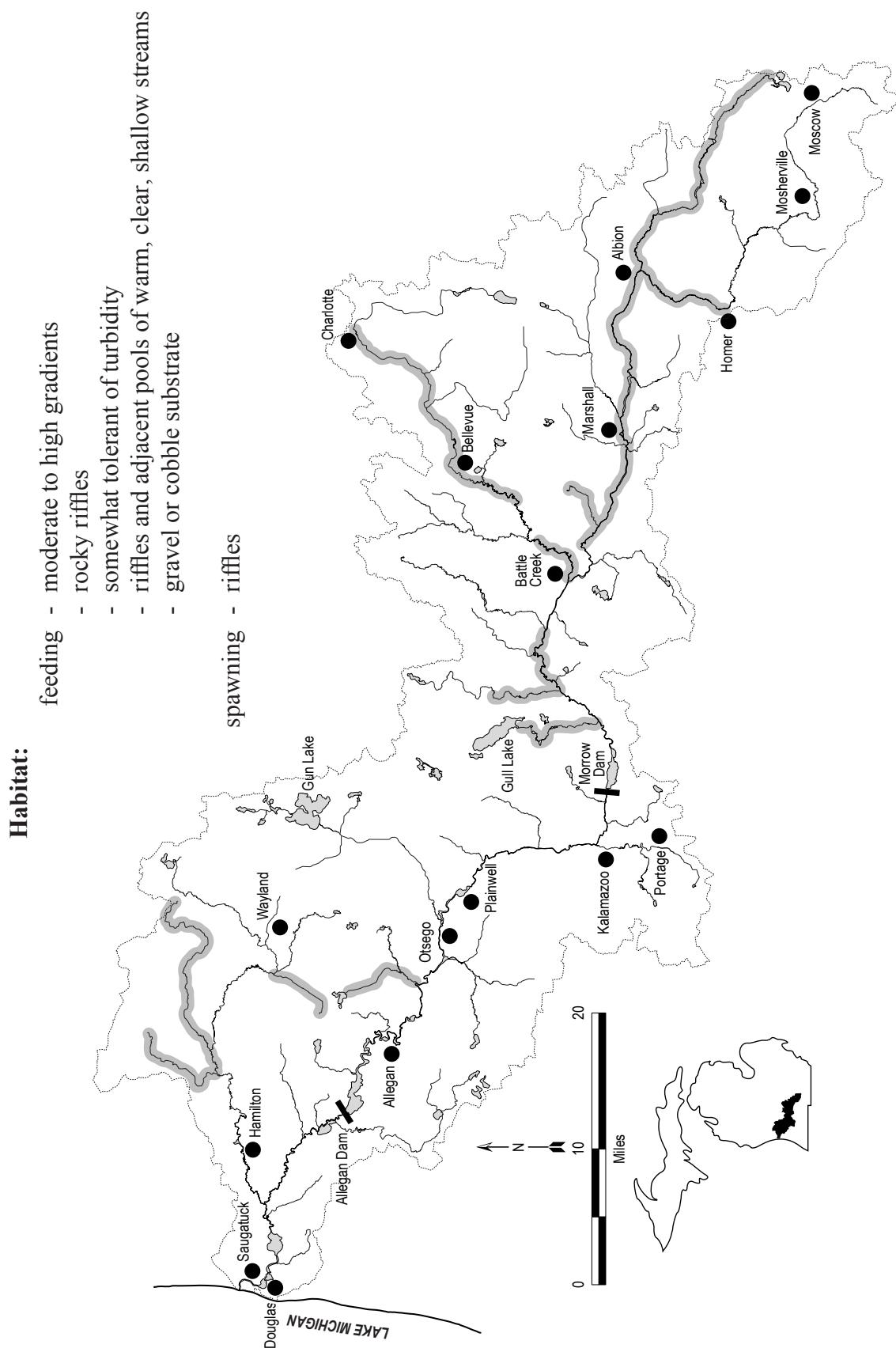


### Gizzard shad (*Dorosoma cepedianum*)

- Habitat:**
- feeding - large streams with low gradient, impoundments, and Lake Michigan
    - tolerant of clear and turbid water
  - spawning - shallow areas of ponds, lakes, and large rivers
    - low gradient



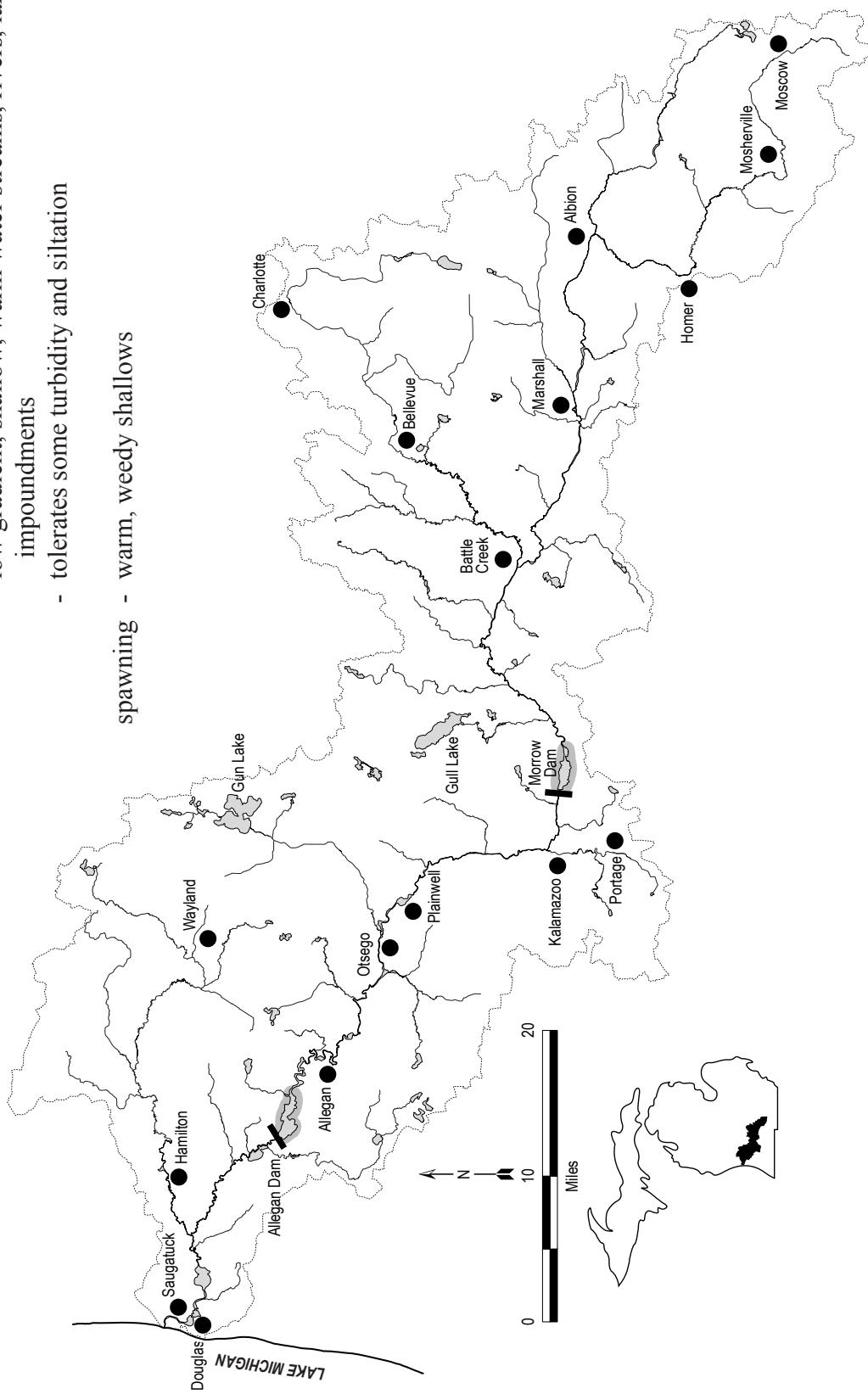
Central stoneroller (*Campostoma anomalum pullam*)



### Goldfish (*Carassius auratus*)

#### Habitat:

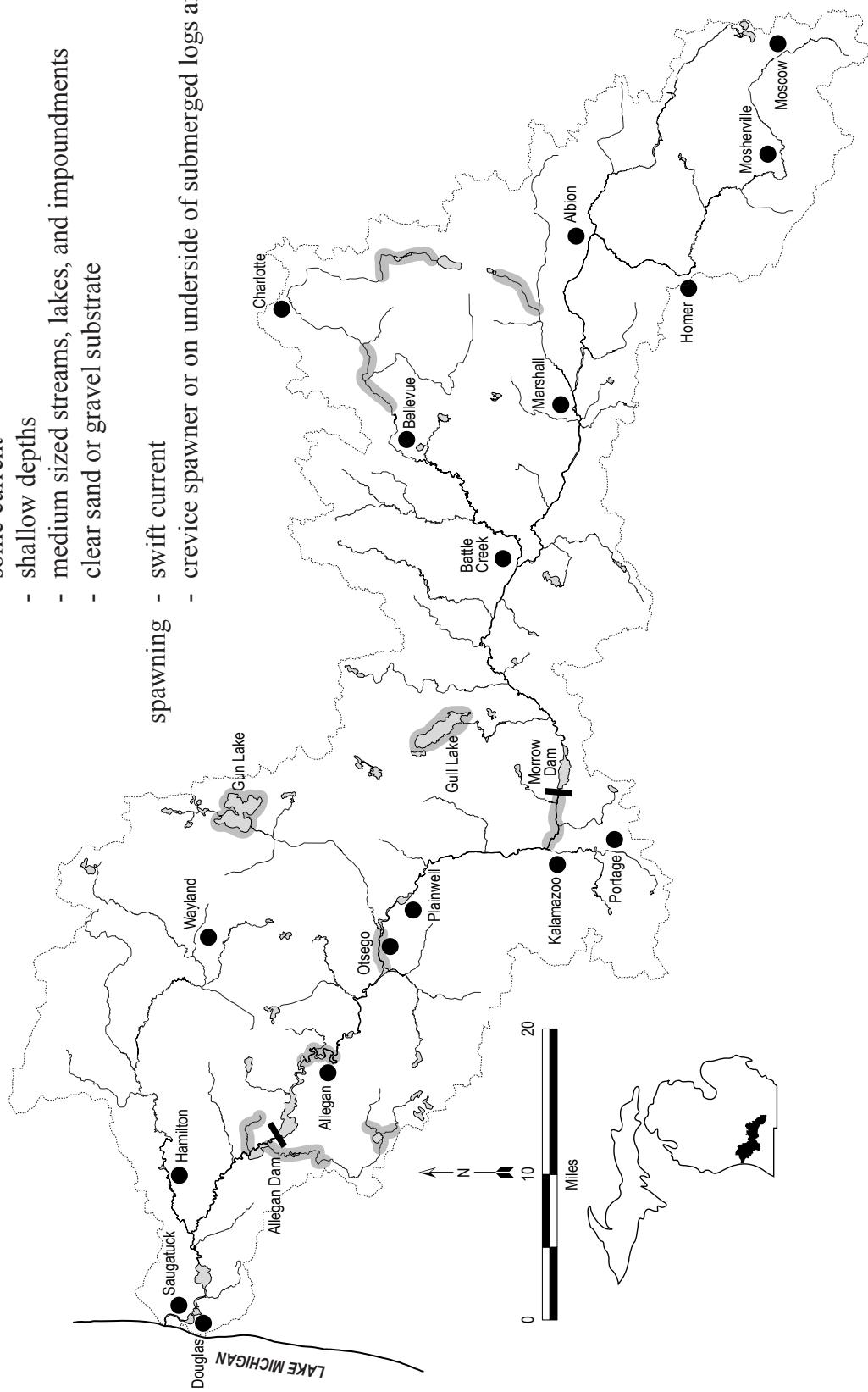
- feeding - vegetation
  - low gradient, shallow, warm water streams, rivers, lakes, and impoundments
  - tolerates some turbidity and siltation
  
- spawning - warm, weedy shallows



**Spotfin shiner (*Cyprinella spiloptera*)**

**Habitat:**

- feeding - clear water tolerant of turbidity and siltation
- some current
  - shallow depths
  - medium sized streams, lakes, and impoundments
  - clear sand or gravel substrate
- spawning - swift current
- crevice spawner or on underside of submerged logs and roots

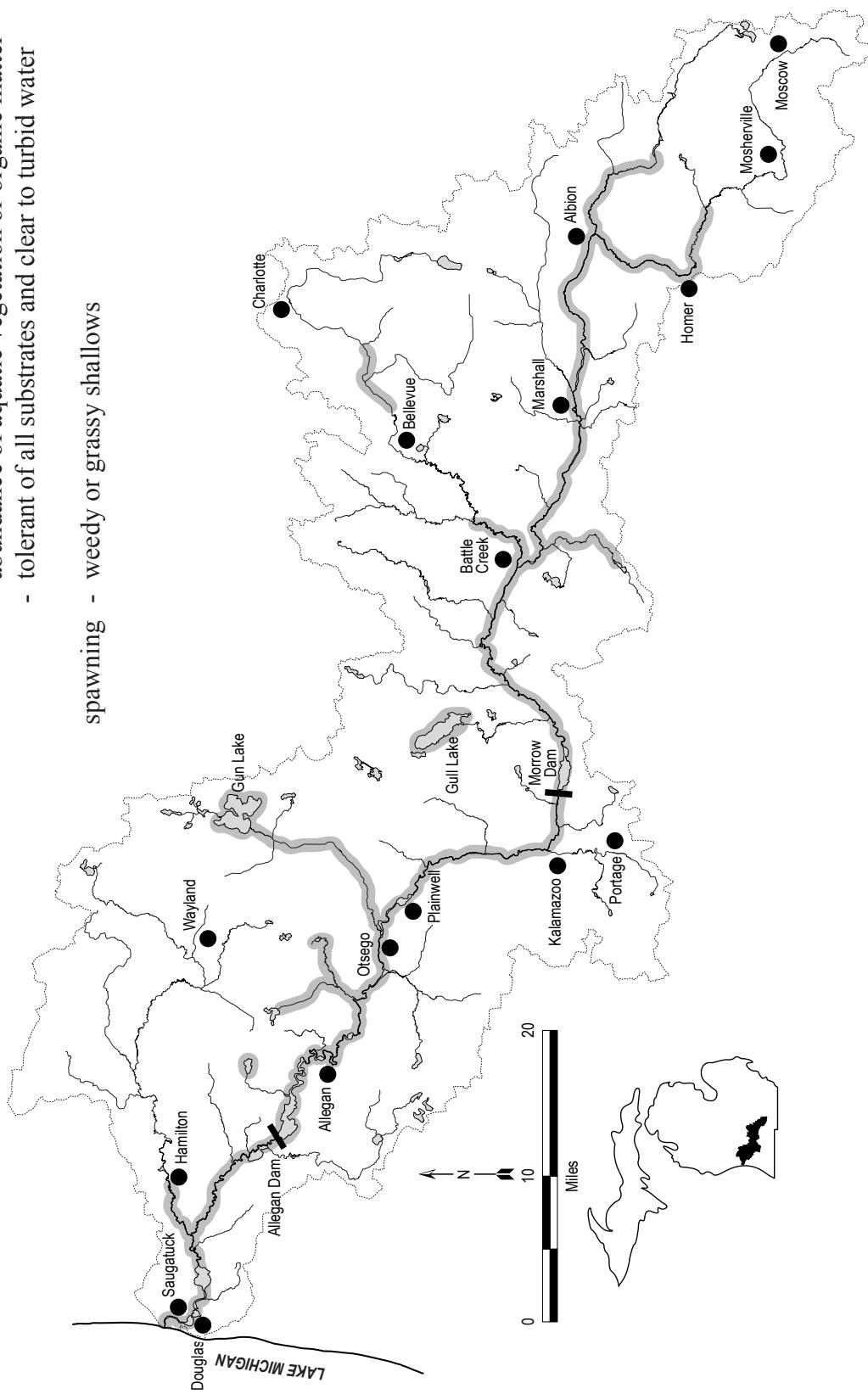


### Common carp (*Cyprinus carpio*)

#### Habitat:

- feeding - low gradient fertile streams, rivers, lakes, and impoundments
  - abundance of aquatic vegetation or organic matter
  - tolerant of all substrates and clear to turbid water

spawning - weedy or grassy shallows

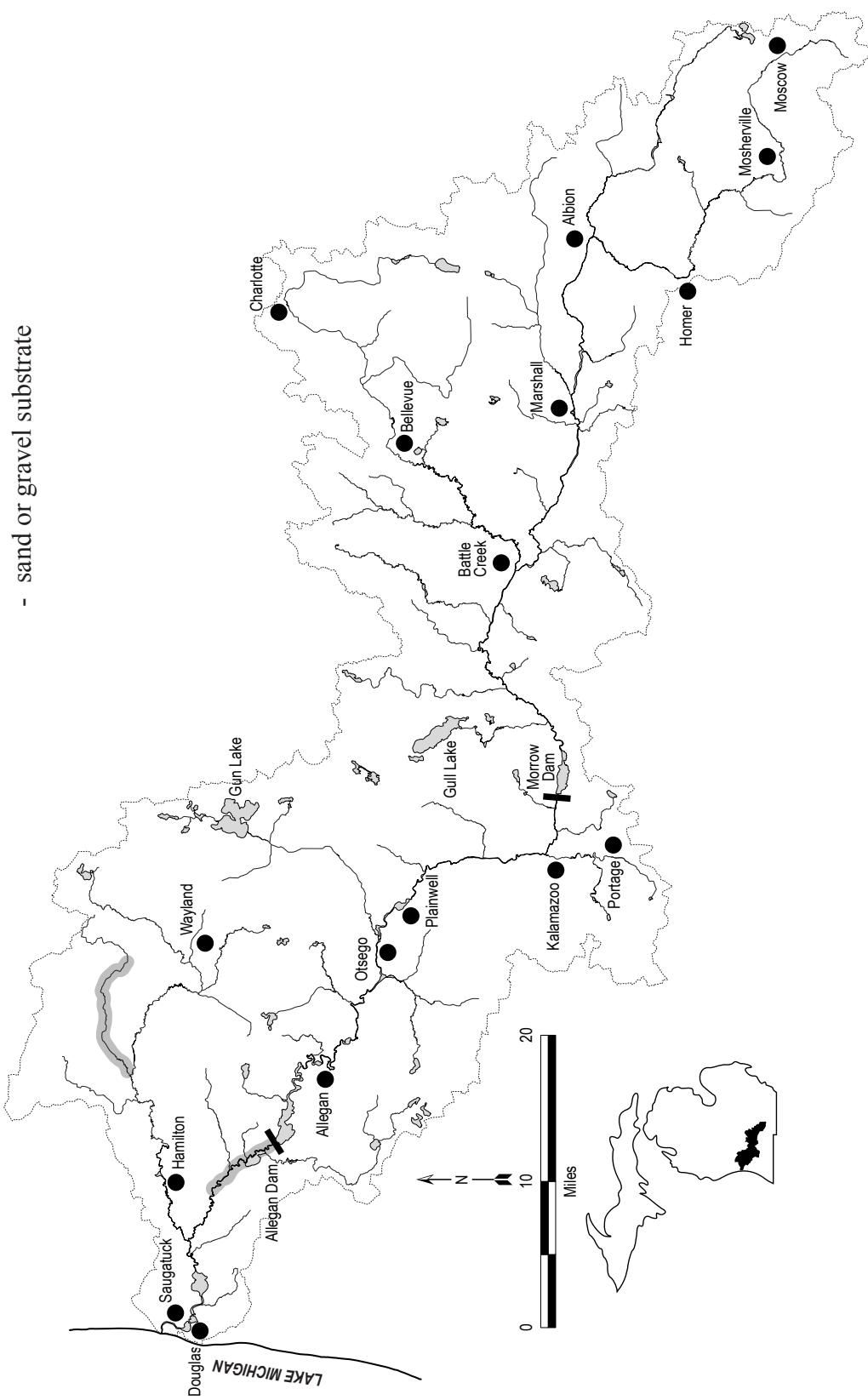


**Brassy minnow (*Hybognathus hankinsoni*)**

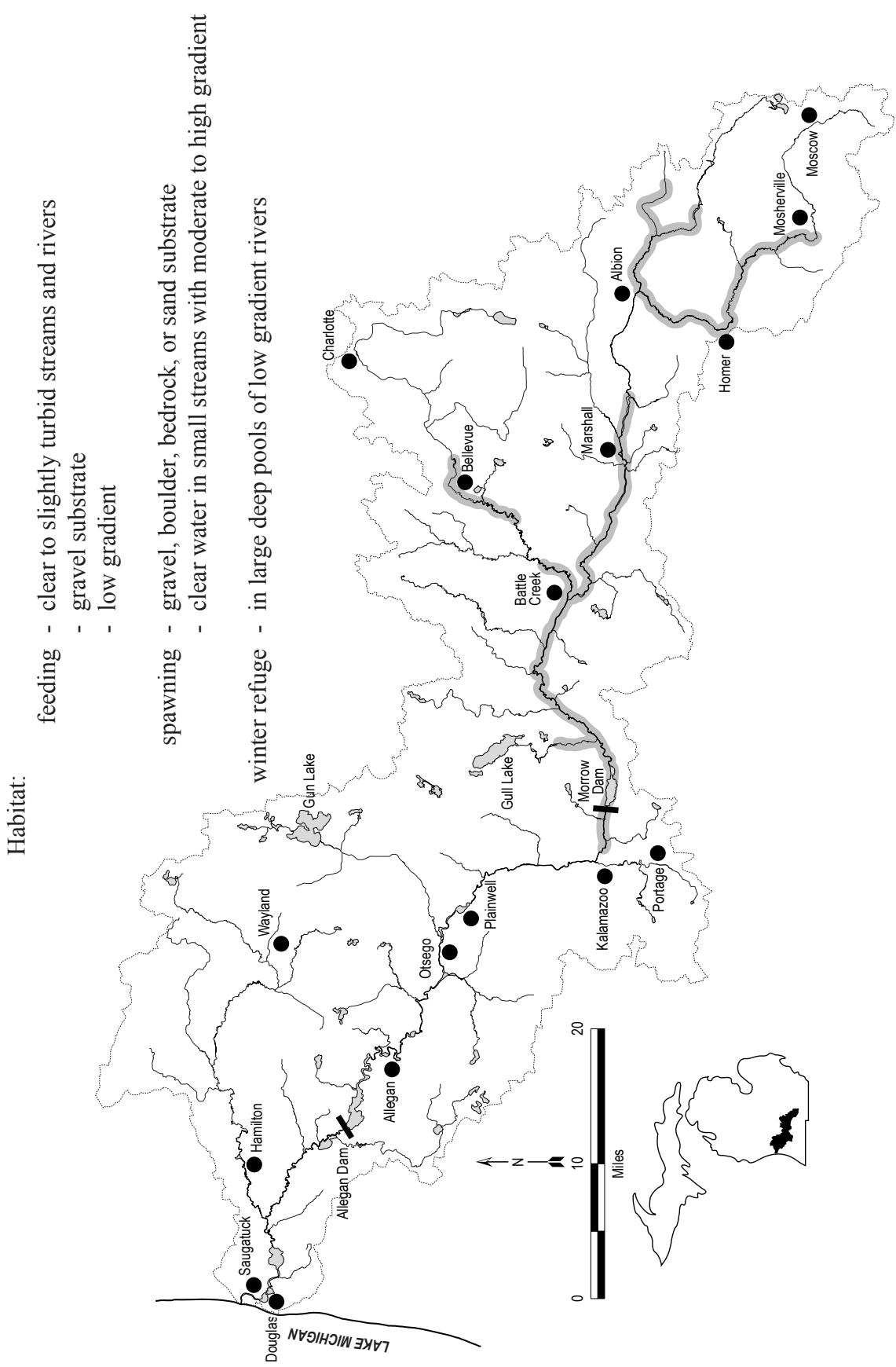
**Habitat:**

feeding - cool acidic streams

- slow to moderate current
- sand or gravel substrate



### Striped shiner (*Luxilus chryscephalus*)



**Common shiner (*Luxilus cornutus*)**

**Habitat:**

- feeding - small, clear, high-gradient streams and rivers, or shores of clear water lakes and impoundments
- gravel substrate
  - can tolerate some submerged aquatic vegetation
  - not very tolerant of turbidity or silted waters
- spawning - gravel nests of other fish, especially those at the head of a riffle

